

I Claim:

1. A test method for measuring the low spatial  
uniformity of a DMD, comprising the steps of:  
5 building a reference surface correction image;  
capturing a test image;  
correcting said test image to remove DMD mirror tilt  
angle non-uniformities from said test image;  
further correcting said test image to remove system  
10 illumination and optics non-uniformities from said  
test image;  
multiplying said test image by said correction  
reference image to produce a low spatial uniformity  
result image; and  
15 extracting low frequency non-uniformity defect data  
from the result image.
2. The test method of Claim 1 wherein said reference  
surface correction image is formed by means of a  
20 light mapping process, comprising the steps of:  
stepping a small 50x50 pixel region of DMD mirrors  
having constant reflectivity from point to point in  
a grid pattern over the field of view of the test  
DMD;  
25 recording the intensity data at each of said points  
in said grid pattern; and

performing a bi-directional interpolation between  
said grid points in two dimensions over image to  
provide said reference surface correction image.

- 5    3.    The test method of Claim 1 wherein test image is  
prepared by means of:

capturing said test image in smaller frames;

removing high spatial non-uniformity components

using a 21x21 pixel smoothing filter;

- 10    stitching said frames together to form a full size  
test image; and

taking average of said frames to remove said  
stitched image boundary discontinuities.

- 15    4.    The test method of Claim 1 wherein said result image  
is obtained for:

+20° illumination relative to 0° DMD mirror tilt  
angle; and

-20° illumination relative to 0° DMD mirror tilt  
20    angle.

5.    The test method of Claim 4 wherein said result image  
isolates and extracts:

high spatial frequency defects;

- 25    stitched frame boundary discontinuities;

DMD mirror tilt angle non-uniformities; and

low frequency illumination source and optics non-uniformities.

6. The test method of Claim 4 wherein:
- 5       said result image is flattened;
- said result image consists essentially of data representing the DMD mirror reflectivity non-uniformities.
- 10   7. A test method for measuring the low spatial uniformity of a DMD, comprising the steps of:
- capturing a test image;
- developing a correction reference surface image which conforms to the average surface of said test
- 15   image;
- developing a gain factor correction image;
- multiplying said test image by said gain factor correction image to provide a flattened low spatial uniformity result image; and
- 20   extracting the low frequency non-uniformity defect data from said result image.
8. The test method of Claim 7 wherein test image is prepared by means of:
- capturing said test image in smaller frames;
- 25   removing high spatial non-uniformity components using a 21x21 pixel smoothing filter;

stitching said frames together to form a full size  
test image; and  
taking average of said frames to remove said  
stitched image boundary discontinuities.

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9. The test method of Claim 7 wherein said result image  
is obtained for:

+20° illumination relative to 0° DMD mirror tilt  
angle; and

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-20° illumination relative to 0° DMD mirror tilt  
angle.

10. The test method of Claim 7 wherein said correction  
reference surface is formed by means of:

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performing a 3x3 pixel lowpass filtering of said  
test image;

sub-sampling of said filtered image to provide a  
representative image having fewer rows and columns;  
using said representative image data to generate a

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set of 2<sup>nd</sup> order equations; and  
using said equations to generate a reference surface  
having only 2<sup>nd</sup> order variations.

11. The test method of Claim 10 wherein said gain factor

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correction image is formed from said reference  
surface data; such that

a flatten image plane results when said reference surface data is multiplied by said gain factor correction image data.

- 5 12. The test method of Claim 11 wherein said result image isolates and extracts:
- high spatial frequency defects;
- stitched frame boundary discontinuities;
- DMD mirror tilt angle non-uniformities; and
- 10 low frequency illumination source and optics non-uniformities.

13. The test method of Claim 12 wherein:
- said result image is flattened;
- 15 said result image consists essentially of data representing the DMD mirror reflectivity non-uniformities.